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Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program; Notice

ENVIRONMENTAL PROTECTION AGENCY

[EPA 530–Z–93–007; FRL–4658–5]

Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program

AGENCY: Environmental Protection Agency [EPA].

ACTION: Interim final guidance.

SUMMARY: EPA is committed to a national policy for hazardous waste management that places the highest priority on waste minimization. To this end, EPA is today providing interim final guidance to assist hazardous waste generators and owners and operators of hazardous waste treatment, storage, or disposal facilities to comply with the waste minimization certification requirements of sections 3002(b) and 3005(h) of the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. 6922(b) and 6925(h).

Section 3002(b) requires generators of hazardous waste to certify on their hazardous waste manifests that they have a waste minimization program in place. Section 3005(h) requires owners and operators of facilities that receive a permit for the treatment, storage, or disposal of hazardous waste on the premises where such waste was generated to make the same certification no less often than annually.

EPA believes waste minimization programs should incorporate, in a way that meets individual organizational needs, the following basic elements common to most good waste minimization programs: (1) Top management support; (2) characterization of waste generation and waste management costs; (3) periodic waste minimization assessments; (4) appropriate cost allocation; (5) encouragement of technology transfer, and (6) program implementation and evaluation. Thus, generators and owners and operators of hazardous waste treatment, storage, and disposal facilities should use these elements to design multimedia pollution prevention programs directed at preventing or reducing wastes, substances, discharges and/or emissions to all environmental media—air, land, surface water and ground water.

EPA is publishing this guidance as an interim final version, and solicits further public comments on it. However, until the guidance is finalized, persons should use it in developing their waste minimization programs in place.

DATES: EPA urges all interested parties to comment on this interim final guidance, in writing, by July 27, 1993.

ADDRESSES: The public must send an original and two copies of their comments to: RCRA Information Center (OS–305), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

Place the docket number F–93–WMIF–FFFFF on your comments.

Commenters who wish to submit any information they wish to claim as Confidential Business Information must submit an original and two copies, under separate cover, to: Document Control Officer (OS–312), Office of Solid Waste, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

FOR FURTHER INFORMATION, CONTACT: Becky Cuthbertson, Office of Solid Waste, 703–308–8447, or the RCRA Hotline, toll free at (800) 424–9346. TDD (800) 553–7672.

SUPPLEMENTARY INFORMATION:

Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program

I. Purpose

The purpose of today's notice is to provide guidance to hazardous waste generators and owners and operators of hazardous waste treatment, storage, and disposal facilities on what constitutes a waste minimization "program in place," in order to comply with the certification requirements of sections 3002(b) and 3005(h) of the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. 6922(b) and 6925(h). Section 3002(b) requires hazardous waste generators who transport their wastes off-site to certify on their hazardous waste manifests that they have programs in place to reduce the volume or quantity and toxicity of hazardous waste generated to the extent economically practicable. Certification of a waste minimization "program in place" is also required as a condition of any permit issued under section 3005(h) for the treatment, storage, or disposal of hazardous waste at facilities that generate and manage hazardous wastes on-site. This guidance fulfills a commitment made by EPA in its 1986 report to Congress [1] entitled The Minimization of Hazardous Waste (EPA/530–SW–86–033, October 1986) to provide additional information to generators on the meaning of the certification requirements placed in HSWA.

Additionally, EPA published in the **Federal Register**, on January 26, 1989 (54 FR 3845), a proposed policy statement on source reduction and recycling. This policy commits the Agency to a preventive strategy to reduce or eliminate the generation of environmentally-harmful pollutants which may be released to the air, land, surface water or ground water. We further proposed to incorporate this preventive strategy into EPA's overall mission to protect human health and the environment by making source reduction a priority for every aspect of Agency decision-making and planning, with environmentally-sound recycling as a second and higher priority over treatment and disposal. Today's notice is an important step in implementing this policy with respect to hazardous wastes regulated under RCRA.

EPA has taken the January 26, 1989 proposed pollution prevention policy statement two steps further: By publishing a "Pollution Prevention Strategy" in the February 26, 1991 **Federal Register** (56 FR 7849), and by proposing the creation of a program that would encourage and publicly recognize environmental leadership, and would promote pollution prevention in manufacturing in the January 15, 1993 **Federal Register** (58 FR 4802).

II. Background

A. Statutory Intent and Requirements and Definition of Waste Minimization

In the past, the predominant practice used by manufacturing, commercial and other facilities that generate hazardous waste has been "end of pipe" treatment or land disposal of hazardous and nonhazardous wastes. While this approach has provided substantial progress in improving the quality of the environment, there are limits as to how much environmental improvement can be achieved using methods which manage pollutants after they have been generated.

With the passage of HSWA in 1984, Congress established a significant new policy concerning hazardous waste management. Specifically, Congress declared that the reduction or elimination of hazardous waste generation at the source should take priority over the management of hazardous wastes after they are generated. In particular, section 1003(b), 42 U.S.C. 6902(b), of RCRA the Congress declares it to be the national policy of the United States that, wherever feasible, the generation of hazardous

[1] 51 FR 44683 (December 11, 1986). Notice of Availability of the report to Congress on waste minimization.

waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment.

In this declaration, Congress established a clear national priority for eliminating or reducing the generation of hazardous wastes. At the same time, however, the national policy recognized that some wastes will "nevertheless" be generated, and such wastes should be managed in a way that "minimizes" present and future threat to human health and the environment.

In 1990, Congress further clarified the role of pollution prevention in the nation's environmental protection scheme, by passing the Pollution Prevention Act (Pub. L. 101–508, 42 U.S.C. 13101, et seq.). In section 6602(b) of this law, 42 U.S.C. 13101(b), Congress stated that national policy of the United States is that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

Thus, Congress set up a hierarchy of management options in descending order of preference: prevention, environmentally sound recycling, environmentally sound treatment, and environmentally sound disposal.

EPA believes that waste minimization, the term employed by Congress in the RCRA statute, includes (1) source reduction, and (2) environmentally sound recycling. (See later discussion for further clarification of which types of recycling are not waste minimization.)

The first category, source reduction, is defined in section 6603(5)(A) of the Pollution Prevention Act, 42 U.S.C. 13102(5)(a), as any practice which (i) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and (ii) Reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

The term includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

EPA believes this definition is appropriate for use in identifying opportunities for source reduction under RCRA.

The second category, environmentally sound recycling, is the next preferred alternative for managing those pollutants which cannot be reduced at the source. In the context of hazardous waste management, there are certain practices or activities which the hazardous waste regulations define as "recycling." The definitions for materials that are "recycled" are found in Title 40 of the Code of Federal Regulations, § 261.1(c). A "recycled" material is one which is used, reused, or reclaimed.[2] A material is "used or reused" if it is (i) employed as an ingredient (including use as an intermediate) in an industrial process to make a product (for example, distillation bottoms from one process used as feedstock in another process) * * * or (ii) employed in a particular function or application as an effective substitute for a commercial product.* * *[3]

A material is "reclaimed" if it is "processed to recover a usable product, or if it is regenerated."[4]

On the other hand, the regulations define "treatment" and "disposal" as follows:

Treatment means any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.[5]

Disposal means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air of discharged into any waters, including ground waters.[6]

Some readers of today's guidance may question whether certain types of recycling are within the concept of waste minimization. EPA believes that recycling activities closely resembling conventional waste management activities do not constitute waste minimization.

Treatment for the purposes of destruction or disposal is not part of waste minimization, but is, rather, an activity that occurs after the opportunities for waste minimization have been pursued.[7] When source reduction and recycling opportunities are exhausted to the extent economically practicable, EPA has set standards for the treatment, storage and disposal of hazardous wastes. Treatment may be either thermal (i.e., incineration), chemical, or biological, especially for organic hazardous wastes. Where destruction methods for treatment are not available or ineffective, immobilization (stabilization) is often effective, especially for inorganic hazardous wastes.

Transfer of hazardous constituents from one environmental medium to another also does not constitute waste minimization. For example, the use of an air stripper to evaporate volatile organic constituents from an aqueous waste only shifts the contaminant from water to air. Furthermore, concentration activities conducted solely for reducing volume does not constitute waste minimization unless, for example, concentration of the waste is an integral setup in the recovery of useful constituents prior to treatment and disposal. Similarly, dilution as a means of toxicity reduction would not be considered waste minimization, unless dilution is a necessary step in a recovery or a recycling operation.

EPA firmly believes that waste minimization will provide additional environmental improvements over "end of pipe" control practices, often with the added benefit of cost savings to generators of hazardous waste and reduced levels of treatment, storage and disposal. Waste minimization has already been shown to result in significant benefits for industry, as evidenced in numerous success stories documented in available literature.

The benefits that accrue to facilities that pursue waste minimization often include:

(1) Minimizing quantities of hazardous waste generated, thereby reducing waste management and compliance costs and improving the protection of human health and the environment;

(2) Reducing or eliminating

[2] 40 CFR 261.1(c)(7).

[3] 40 CFR 261.1(c)(5).

[4] 40 CFR 261.1(c)(4).

[5] 40 CFR 260.10. Most types of recycling are in fact classified as treatment (see 48 FR at 14502–14504, April 4, 1983), and some also meet the definition of disposal.

[6] 40 CFR 260.10.

[7] It is, of course, not always easy to distinguish recycling (environmentally sound or otherwise) from conventional treatment. See 56 FR at 7143 (February 21, 1991); 53 FR at 522 (January 8, 1988).

inventories and possible releases of "hazardous chemicals;"
(3) Possible decrease in future Superfund and RCRA liabilities, as well as future toxic tort liabilities;
(4) Improving facility mass/energy efficiency and product yields;
(5) Reducing worker exposure; and
(6) Enhancing organizational reputation and image.

In addition to establishing a national policy to foster waste minimization, HSWA also included several specific requirements that promote implementation of waste minimization at individual facilities. In particular, RCRA section 3002(b) requires generators of hazardous waste who transport wastes off-site to certify on each hazardous waste manifest that they have a program in place to reduce the volume and toxicity of such waste to the degree determined by the generator to be economically practicable. Similarly, certain owners and operators of RCRA permitted treatment, storage and disposal facilities are also required to provide the same certification annually (RCRA Section 3005(h)). These two requirements for certification, taken together, have the effect of insuring that waste minimization programs are put in place for facilities that generate hazardous waste regardless of whether the wastes are managed on-site or off-site. The purpose of today's Federal Register notice is to provide guidance to these hazardous waste handlers, who must certify that they have a waste minimization program in place.

Hazardous waste generators and owners/operators of hazardous waste treatment, storage and disposal facilities who manage their own hazardous waste on-site, must also identify in a biennial report to EPA (or the State): (1) The efforts undertaken during the year to reduce the volume and toxicity of waste generated; and (2) the changes in volume and toxicity actually achieved in comparison to previous years.

B. Scope of This Notice

Today's notice provides guidance on the basic elements of a waste minimization "program in place" that, if present, will allow persons to properly certify that they have implemented a program to reduce the volume and toxicity of hazardous waste to the extent "economically practicable." The guidance is directly applicable to generators who generate 1000 or more kilograms per month of hazardous waste ("large quantity" generators) or to owners and operators of hazardous waste treatment, storage, or disposal facilities who manage their own hazardous waste on-site.

Small quantity generators who generate greater than 100 kilograms but less than 1000 kilograms of hazardous waste per month are not subject to the same "program in place" certification requirement as large quantity generators. Instead, they must certify on their hazardous waste manifests that they have "made a good faith effort to minimize" their waste generation. EPA encourages small quantity generators to develop waste minimization programs of their own, to show their good faith efforts.

This notice does not provide guidance on the determination of the phrase "economically practicable". As Congress indicated in its accompanying report to HSWA (S. Rep. No. 98–284, 98th Cong. 1st. Sess., 1983) "economically practicable" is to be defined and determined by the generator. The generator of the hazardous waste, for the purpose of meeting this certification requirement, has the flexibility to determine what is economically practicable for the generator's particular circumstances. Whether this determination is done in a combined fashion for all operations or on a site-specific basis is for the generator to decide.

III. Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program, as Required Under RCRA Sections 3002(b) and 3005(h)[8]

Waste minimization programs have been implemented by a wide array of organizations. The elements discussed in this notice reflect the results of EPA interactions with State governments and industry waste minimization program managers. Numerous state governments have already enacted legislation requiring facility specific waste minimization programs (for example, the enactment of the Massachusetts Toxics Use Reduction Act of 1989, Oregon Toxics Use Reduction and Hazardous Waste Reduction Act, and Art. 11.9, Chap. 6.5, Div. 20 of California Health and Safety Code, October 1989.) Other states have legislation pending that may mandate some type of facility specific waste minimization program.

EPA believes that each of the general elements discussed below should be included in a waste minimization program, although the Agency realizes that each element may be implemented in different ways depending on the needs and preferences of individual organizations or facilities. The generator or treatment, storage, or disposal facility should document its program (in writing) so that it is available for interested parties. EPA also believes that the waste minimization program should be signed by that corporate officer who is responsible for ensuring RCRA compliance.

The waste minimization program elements are as follows:

A. Top management support. Top management should support an organization-wide effort. There are many ways to accomplish this goal. Some of the methods described below may be suitable for some organizations, while not for others. However, some combination of these techniques or similar ones will demonstrate top management support:

—Make waste minimization a part of the organization policy. Put this policy in writing and distribute it to all departments and individuals. Each individual, regardless of status or rank, should be encouraged to identify opportunities to reduce waste generation. Encourage workers to adopt the policy in day to day operations and encourage new ideas at meetings and other organizational functions. Waste minimization, especially when incorporated into organization policy, should be a process of continuous improvement. Ideally, a waste minimization program should become an integral part of the organization's strategic plan to increase productivity and quality.
—Set explicit goals for reducing the volume and toxicity of waste streams that are achievable within a reasonable time frame. These goals may be quantitative or qualitative. Both can be successful.
—Commit to implementing recommendations identified through assessments, evaluations, waste minimization teams, etc.
—Designate a waste minimization coordinator who is responsible for facilitating effective implementation, monitoring and evaluation of the program. In some cases (particularly in large multi-facility organizations), an organizational waste minimization coordinator may be needed in addition to facility coordinators. In other cases, a single coordinator may have responsibility for more than one facility. In these cases, the coordinator

[8] On June 12, 1989, the EPA published a proposed guidance on what constituted a "program in place", and solicited public comments. 33 comments were received in response to the draft guidance; most comments suggested clarifications or expansion of specific points, while some comments disagreed with portions of the proposal. Both the comments and EPA's response to the comments are summarized in the Appendix to this notice.

should be involved or be aware of operations and should be capable of facilitating new ideas at each facility. It is also useful to set up self-managing waste minimization teams chosen from a broad spectrum of operations: engineering, management, research & development, sales & marketing, accounting, purchasing, maintenance and environmental staff personnel. These teams can be used to identify, evaluate and implement waste minimization opportunities.

—Publicize success stories. Set up an environment and select a forum where creative ideas can be heard and tried. These techniques can inspire additional ideas.

—Recognize individual and collective accomplishments. Reward employees that identify cost-effective waste minimization opportunities. These rewards can take the form of collective and/or individual monetary or other incentives for improved productivity/waste minimization.

—Train employees on the waste-generating impacts that result from the way they conduct their work procedures. For example, purchasing and operations departments could develop a plan to purchase raw materials with less toxic impurities or return leftover materials to vendors. This approach can include all departments, such as those in research & development, capital planning, purchasing, production operations, process engineering, sales & marketing and maintenance.

B. Characterization of waste generation and waste management costs. Maintain a waste accounting system to track the types and amounts of wastes as well as the types and amounts of the hazardous constituents in wastes, including the rates and dates they are generated. EPA realizes that the precise business framework of each waste generator can be unique. Therefore, each organization must decide the best method to obtain the necessary information to characterize waste generation. Many organizations track their waste production by a variety of means and then normalize the results to account for variations in production rates.

Additionally, a waste generator should determine the true costs associated with waste management and cleanup, including the costs of regulatory oversight compliance, paperwork and reporting requirements, loss of production potential, costs of materials found in the waste stream (perhaps based on the purchase price of those materials), transportation/treatment/storage/disposal costs, employee exposure and health care, liability insurance, and possible future RCRA or Superfund corrective action costs. Both volume and toxicities of generated hazardous waste should be taken into account. Substantial uncertainty in calculating many of these costs, especially future liability, may exist. Therefore, each organization should find the best method to account for the true costs of waste management and cleanup.

C. Periodic waste minimization assessments. Different and equally valid methods exist by which a waste minimization assessment can be performed. Some organizations identify sources of waste by tracking materials that eventually wind up as waste, from point of receipt to the point at which they become a waste. Other organizations perform mass balance calculations to determine input and outputs from processes and/or facilities. Larger organizations may find it useful to establish a team of independent experts outside the organization structure, while some organizations may choose teams comprised of in-house experts.

Most successful waste minimization assessments have common elements that identify sources of waste and calculate the true costs of waste generation and management. Each organization should decide the best method to use in performing a waste minimization assessment that addresses these two general elements:

—Identify opportunities at all points in a process where materials can be prevented from becoming a waste (for example, by using less material, recycling materials in the process, finding substitutes that are less toxic and/or more easily biodegraded, or making equipment/process changes). Individual processes or facilities should be reviewed periodically. In some cases, performing complete facility material balances can be helpful.

—Analyze waste minimization opportunities based on the true costs associated with waste management and cleanup. Analyzing the cost effectiveness of each option is an important factor to consider, especially when the true costs of treatment, storage and disposal are considered.

D. A cost allocation system. Where practical and implementable, organizations should appropriately allocate the true costs of waste management to the activities responsible for generating the waste in the first place (e.g., identifying specific operations that generate the waste, rather than charging the waste management costs to "overhead"). Cost allocation can properly highlight the parts of the organization where the greatest opportunities for waste minimization exist; without allocating costs, waste minimization opportunities can be obscured by accounting practices that do not clearly identify the activities generating the hazardous wastes.

E. Encourage technology transfer. Many useful and equally valid techniques have been evaluated and documented that are useful in a waste minimization program. It is important to seek or exchange technical information on waste minimization from other parts of the organization/facility, from other companies/facilities, trade associations/affiliates, professional consultants and university or government technical assistance programs. EPA and/or State funded technical assistance programs (e.g., Minnesota Technical Assistance Program—MnTAP, California Waste Minimization Clearinghouse, EPA Pollution Prevention Information Clearinghouse) are becoming increasingly available to assist in finding waste minimization options and technologies.

F. Program implementation and evaluation. Implement recommendations identified by the assessment process, evaluations, waste minimization teams, etc. Conduct a periodic review of program effectiveness. Use these reviews to provide feedback and identify potential areas for improvement.

IV. Additional Resources Available to Generators and Others on Waste Minimization Programs

EPA and the States have worked cooperatively to put in place a variety of technical information and assistance programs that make information on source reduction and recycling techniques available directly to industry and the public.

EPA has developed information sources that can be used to provide information directly to industry or through State technical assistance programs. EPA maintains a Pollution Prevention Information Clearinghouse (PPIC), which is a reference and referral source for technical, policy, program, legislative and financial information on pollution prevention. PPIC's telephone number is (202) 260–1023; the facsimile number is (202) 260–0178. EPA also publishes a pollution prevention newsletter and produces videos and

literature on waste minimization that are available to the public.[9]

Examples of general documents that assist organizations with more detailed guidance on conducting waste minimization assessments and developing pollution prevention programs are the Waste Minimization Opportunity Assessment Manual, EPA 625/7–88/003, July 1988,[10] and the Facility Pollution Prevention Guide, EPA/600/R–92/088.[11] Another general document that introduces the concept of waste minimization is Waste Minimization: Environmental Quality with Economic Benefits, EPA/530–SW–90–044, April 1990.[12] EPA has also developed numerous waste minimization and pollution prevention documents that are tailored to specific manufacturing and other types of processes, and periodically sponsors pollution prevention workshops and conferences.

EPA also promotes technical assistance to industry indirectly by supporting the development of State technical assistance programs. State personnel often have the primary day to day contacts with industry for many RCRA program matters. Examples of State technical assistance programs are; Minnesota Technical Assistance Program—MnTAP and California Waste Minimization Clearinghouse. EPA also provides partial funding for the National Roundtable of State Pollution Prevention Programs, an organization of State technical assistance and regulatory program representatives that meets regularly to discuss technical and programmatic waste minimization issues. The Roundtable uses the PPIC as a central repository for technical exchange and publishes proceedings on state waste minimization activities. EPA's Office of Research and Development also funds several different types of waste minimization research and demonstration projects in a variety of joint ventures with States and industry, and publishes industry-specific pollution prevention guidances.[13]

[9] To be added to the newsletter's mailing list, write: Pollution Prevention News, U.S. EPA, PM–222B, 401 M St. SW., Washington, DC 20460.

[10] Available from the National Technical Information Service; telephone (703) 487–4650; the publication number is PB 92–216 985 and the cost is $27.00.

[11] Available by calling the CERI Publications Unit at EPA's Cincinnati, OH office at (513) 569–7562.

[12] Available by calling the RCRA Information Center; telephone (202) 260–9327.

[13] Contact the CERI publications unit at EPA's Cincinnati, OH office, telephone (513) 569–7562, for a list of available pollution prevention publications.

Additionally, at least 29 states reported in their Capacity Assurance Plans (October 1989) that they have in place some type of technical assistance to organizations that seek alternatives to treatment, storage and disposal of waste.

V. Conclusion

EPA is committed to the elimination, reduction, and/or recycling of waste as the first steps in our national waste management strategy. Only through preventing pollution in the first place will our nation be able to ensure both a healthy, vibrant economy that can prevail in a competitive worldwide economy, and a healthy environment that provides us with the resources we need and use in our everyday lives. As a result of the approach Congress has set in both the national policy of RCRA and in the Pollution Prevention Act, generators of waste must shoulder some of the responsibility to implement waste minimization measures, which will assist in prevention of risks to today's and tomorrow's environment. Generators have demonstrated the usefulness and benefits of waste minimization practices. EPA believes that as more organizations implement their waste minimization programs and demonstrate their usefulness and benefits, many other organizations will be encouraged to seek greater opportunities to incorporate waste minimization in their operations. Today's guidance on the elements of effective waste minimization programs may help encourage regulated entities to investigate waste minimization alternatives, implement new programs, or upgrade existing programs. Although the approaches described above are directed toward minimizing hazardous waste, they are also important elements in the design of multi-media source reduction and recycling programs for all forms of pollution.

Dated: May 18, 1993.

Carol M. Browner,

Administrator.

Appendix

Response to Comments on EPA's Draft "Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program"

One respondent objected to the nonbinding approach of the guidance, stating that some basic definition of program acceptability should be specifically given. This respondent stated that the approach would encourage only a voluntary effort to implement waste minimization programs. However, most respondents supported the approach and encouraged EPA to retain this approach in the final guidance. These respondents stated that the flexibility inherent in the approach should assist organizations in implementing effective waste minimization programs appropriate to specific circumstances and processes.

While RCRA makes it clear that the waste minimization certification provisions are mandatory and enforceable, the Agency believes that it is the intent of Congress to allow for flexibility in implementing facility specific waste minimization programs. In setting forth the waste minimization approach given in this interim final guidance, EPA believes it has acted in a manner that follows Congressional intent. Because of this, the Agency does not believe it is necessary to describe the approach in the interim final guidance text as "nonbinding" because such a term would be redundant; the guidance is nonbinding by being guidance. However, while the specific elements are guidance, the certification requirements of sections 3002(b) and 3005(h) are mandatory. The nature of the guidance does not reduce in any way these mandatory certification requirements.

Another respondent stated that EPA's definition of waste minimization is too restrictive in allowing only source reduction and recycling activities to define waste minimization. While activities of this nature may be the most desirable, Congress clearly stated the overall goal was to "minimize the present and future threat to human health and the environment." Therefore, better treatment and proper disposal could be considered a part of waste minimization. By not defining treatment and disposal as part of waste minimization, the commenter believed that EPA may be discouraging improvements which could be environmentally beneficial.

The Agency has clearly stated its position that a waste management hierarchy exists where source reduction and environmentally-sound recycling are the primary and secondary priorities of the waste management hierarchy and together define waste minimization. Treatment and disposal are alternatives of last resort to waste minimization, not substitutes for it. EPA disagrees with the respondent's suggestion that defining waste minimization as source reduction and recycling could discourage improvements in treatment and disposal technologies. On the contrary, EPA believes that the main thrust of the RCRA program has been to improve treatment and disposal technology. The Agency believes that the intent of the HSWA National Policy was to move beyond treatment and disposal approaches to prevention approaches. It is on this basis that the Agency concludes that treatment and disposal are not (nor should they be) part of waste minimization.

Guidance Element A: Top Management Support and Facility Coordination:

This element of the proposed guidance stated that top management should ensure that waste minimization is a company-wide effort. Several techniques were proposed that should be used to demonstrate top management support.

Several respondents stated that employee education and feedback as well as management support is important to the success of a waste minimization plan. The Agency agrees that employee education and

management support is an important element of any waste minimization program. However, the Agency believes that each organization should decide what the parameters of that support will be, based upon its organizational structure. For example, in some organizations, support may take the form of a directive from top management formally establishing waste minimization teams. In other organizations, support might be in the form of extending the scope of existing quality circles to include waste minimization. What is appropriate for one organization might not be appropriate for others.

Many respondents also recommended that the policy should acknowledge that in some cases individual facility coordinators may be inappropriate, especially for companies with numerous small and/or similar facilities. Respondents suggested that in these cases, a national or regional coordinator may be more appropriate. EPA believes that the key function of a coordinator is to facilitate and maintain plant planning and operations. The most successful programs have an on-site person who deals with day to day tasks necessary to keep the program on track and consistent with organizational goals. Some organizations with multiple facilities also have a coordinator whose function is to facilitate communication and informational flow between facilities and top management and ensure that adequate support is available. Nevertheless, EPA believes each organization should determine how best to fulfill the functions of managing and coordinating waste minimization activities.

Finally, one respondent stated that EPA should recognize that the setting of aggressive goals by upper management to demonstrate commitment may prove counterproductive when these goals are not realized. The Agency believes that the setting of specific, realistic goals is very important to the success of a waste minimization program. However, each organization must determine what these goals are as well as how they are achieved and the timetable for their achievement. These goals can be qualitative and/or quantitative, but can only be successful if management fully supports employee efforts to achieve them. Both types of goals can be successful.

Guidance Element B: Characterizing Waste Generation and Waste Accounting:

This element of the proposed guidance stated that a waste accounting system to track the types, amounts and hazardous constituents of wastes and the dates they are generated should be maintained.

Some respondents recommended that EPA should clarify that waste accounting systems must be unique to each facility and that this uniqueness is a function of the size of the generator as well as waste characteristics and volumes, processes, and other circumstances surrounding waste generation. Therefore, since no two waste accounting systems can be precisely alike, EPA will not mandate any specific type of waste accounting system.

The Agency agrees that each waste accounting system should be facility-specific and should be designed to accommodate each of the parameters mentioned by the respondent. In fact, EPA did not specify particular waste accounting systems in the proposed guidance for precisely those reasons. However, it is important that each facility and/or organization have a system that identifies and characterizes all waste streams and their sources, whatever form the system takes. The Agency believes that there are key parameters that waste accounting systems should address. Among these are identification of all wastes in terms of volume and toxicity as well as sources of all wastes. EPA also believes that it is critical to account for the costs of managing the wastes, including the amounts and costs of raw materials or other by-products found in waste streams and the costs of compliance with the regulations for treatment, storage, and disposal of hazardous wastes.

One respondent indicated that tracking of the rates of waste generation is not mentioned as a program element and that the rates of waste generation are more relevant than the dates of generation as was stated in the draft guidance. The Agency agrees that rates of waste generation are more likely to be relevant than the dates of waste generation when tracking waste generation. However, both are important to providing a clear picture of the sources and quantities of waste. Therefore, the interim final guidance has been changed accordingly.

Guidance Element C: Periodic Waste Minimization Assessments:

This element of the proposed guidance stated that periodic waste minimization assessments should be conducted to identify opportunities for waste minimization and to determine the true costs of waste.

One respondent suggested that the section on periodic waste minimization assessments should contain a flexibility clause stating that there are a number of different ways to accomplish a waste minimization assessment. The respondent stated that some of the methods described in the draft guidance may be suitable for some organizations but not others. In particular, many materials that become wastes do not originate from "loading dock materials" as stated in the draft guidance. Also, some wastes are listed as hazardous because they are residues (by-products) from a specified process or processes and as such would be difficult to track from the "loading dock".

The Agency agrees that there are different ways to complete a waste minimization assessment. In some cases, the actual practice of tracking raw materials through the production process to the point where they become wastes can be exceedingly complex, such as in petrochemical plants where integrally linked processes use multiple raw material inputs. Each organization should determine what level of analysis is necessary to provide adequate information to formulate waste minimization alternatives. The waste minimization team conducting a waste minimization assessment can make this determination.

The interim final guidance has been changed to clarify this point. The interim final guidance stresses that some level of process tracking or materials balance should be used to identify sources and volumes of waste. The interim final guidance stresses that all approaches used should cover five key elements including: waste stream characterization; identification and tracking of wastes; the determination of the true cost of treatment, storage, and disposal; allocation of costs to the activities responsible for waste generation; and identification of opportunities for waste minimization. [Note that information developed in the waste accounting and allocation system is critical to identifying waste minimization opportunities.]

One respondent stated that this section should specifically state that the purchasing of materials and packaging that have been designed to facilitate reuse and recycling should be specified as an identified opportunity for waste minimization.

The Agency agrees that the use of packaging that is designed to facilitate reuse and recycling can be an opportunity in waste minimization. However, numerous suggestions for specific types of waste minimization opportunities were received from respondents. The EPA acknowledges that there are many examples of waste minimization opportunities. However, for the sake of brevity they could not all be included in either the draft guidance or interim final guidance.

Another respondent indicated that EPA should state more forcefully in its interim final guidance that finding substitutes to toxic materials that pose less of a danger to human health and the environment and that are more easily degraded is an important opportunity in waste minimization. The Agency agrees that material substitution is an important aspect of waste minimization, which has been appropriately emphasized in the draft and interim final guidance.

Another respondent suggested that a waste minimization assessment should commence from the "point of receipt" of raw materials rather that "from the loading dock" as written in the draft guidance. The reason for this is that loading docks are used for shipping as well as receiving. The Agency agrees and has changed the language of the interim final guidance accordingly.

Guidance Element D: A Cost Allocation System:

This element of the proposed guidance stated that departments and managers should be charged "fully-loaded" waste management costs for the wastes they generate, factoring in liability, compliance and oversight costs. The guidance encourages organizations to develop and maintain a system for determining and monitoring waste stream characteristics and costs. This information provides a basis for identifying waste minimization opportunities which is discussed further in guidance element F.

Two respondents indicated that the entire Cost Allocation Section should be deleted from the guidance, stating that the guidance is too specific, and that use of the phrase "fully-loaded waste management costs" in the draft guidance implies cost accounting procedures that may not be compatible with existing organizational accounting practices. However, several respondents stated that it was appropriate for EPA to suggest that a waste minimization program include waste management accounting costs, with the understanding that it is inappropriate for EPA to specify the actual methods to be used.

Organizations that have implemented successful waste minimization programs have incorporated cost accounting methods which take into account direct and indirect waste management costs, the costs of lost production, raw materials, treatment, disposal as well as reduced cleanup and liability costs. An understanding of the full costs of waste generation and management is often a critical element for justifying waste minimization decisions.

The Agency does not believe that the cost accounting procedures detailed in the Cost Allocation Section are unduly specific as might have been construed from the phrase "fully-loaded waste management costs". However, this phrase has been deleted from the interim final guidance and the concept has been reworded as "a system to appropriately allocate the true costs of waste management to the activities responsible for generating the waste in the first place" to clarify the Agency's intent. EPA's Waste Minimization Opportunity Assessment Manual (July 1988), and Facility Pollution Prevention Guide (May 1992) provide a sample of a waste accounting system.

Guidance Element E: Encourage Technology Transfer:

This element of the proposed guidance stated that technology transfer on waste minimization should be encouraged from other parts of a company, from other firms, trade associations, State and university technical assistance programs or professional consultants.

Several respondents strongly supported the exchange of waste minimization information among all sources. One respondent stated that variability among facilities requires that judgements on the applicability of technology be made on a facility-specific basis with considerable input from production personnel at the facility. Another respondent indicated that EPA should include specific information on waste minimization resources available to the public from the EPA.

The Agency agrees that the exchange of waste information among all sources is a key factor in the transfer of technology and that production personnel need to play a major role in the application of appropriate technologies. The interim final guidance has additional wording to stress these points. Additionally, a section detailing information on waste minimization programs has been added to the interim final guidance.

Guidance Element F: Program Evaluation:

This element of the proposed guidance stated that a periodic review of program effectiveness should be conducted and that the review be used to provide feedback and identify potential areas for improvement.

In general, the respondents strongly supported periodic program evaluations that can be used to identify areas for improvement and enhance the effectiveness of waste minimization programs.

The Agency continues to support periodic program evaluations as an element in this guidance. To strengthen this section, however, the name has been changed to "Program Implementation and Evaluation" in order to give additional emphasis to implementing as well as evaluating opportunities identified by the assessment process.

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